

We claim:

1. A treatment catheter comprising:
 - a shaft having a shaft distal end and a shaft proximal end;
 - 5 a treatment head disposed about the shaft distal end, the treatment head adapted to present a low profile in a closed state and a broad profile in a deployed state, the treatment head adapted to percutaneously treat one of first and second tissue layers and protect the other of the first and second tissue layers from the treatment.
- 10 2. The treatment catheter of claim 1, the treatment head further comprising:
 - a canopy having a protection side facing a direction distal from the shaft and a treatment side facing a direction proximate the shaft, the canopy supported by a frame assembly comprising a runner, a plurality of main ribs, a supporting rib coupled to each main rib, and an upper joint, the runner coupled to the shaft and moveable in an
 - 15 axial direction thereon, each main rib having a main rib outer end and a main rib inner end pivotally coupled to the shaft distal end at the upper joint, each supporting rib having a supporting rib inner end pivotally coupled to the runner and a supporting rib outer end pivotally coupled to the main rib, wherein the movement of the runner along the shaft from distal the upper joint to proximate the upper joint positions the
 - 20 frame assembly between a closed and deployed position, and therefore closes and deploys the canopy.
3. The treatment catheter of claim 2, wherein the treatment side comprises treatment elements.
- 25 4. The treatment catheter of claim 3, wherein the treatment elements radiate from a central portion of the treatment side.
5. The treatment catheter of claim 3, wherein the treatment elements radiate in a
- 30 spiral pattern from a central portion of the treatment side.

6. The treatment catheter of claim 3, wherein the treatment elements are present in discrete locations on the treatment side.
- 5 7. The treatment catheter of claim 3, wherein the treatment elements are resistive heating elements that provide a predetermined amount of heat.
8. The treatment catheter of claim 3, wherein the treatment elements are fiber optic elements that are adapted to provide a predetermined amount of laser energy.
- 10 9. The treatment catheter of claim 3, wherein the treatment elements are adapted to discharge fluid.
- 15 10. The treatment catheter of claim 3, wherein the treatment elements comprise radio-frequency emitting elements that provide a predetermined amount of RF.
11. The treatment catheter of claim 1, the treatment head further comprising:
a canopy having a protection side facing a direction distal from the shaft and a treatment side facing a direction proximate the shaft, the canopy supported by a frame
20 assembly comprising a runner, a plurality of main ribs, a supporting rib coupled to each main rib, and an upper joint, the runner coupled to the shaft and moveable in an axial direction thereon, each main rib having a main rib outer end and a main rib inner end pivotally coupled to the shaft distal end at the upper joint, each supporting rib having a supporting rib inner end pivotally coupled to the runner and a supporting rib
25 outer end pivotally coupled to the main rib, wherein the movement of the runner along the shaft from distal the upper joint to proximate the upper joint positions the frame assembly between a closed and deployed position, and therefore closes and deploys the canopy.

12. The treatment catheter of claim 1, the treatment head further comprising:
an inflatable canopy having a protection side facing a direction distal from the shaft and a treatment side proximate the shaft, the inflatable canopy having a predefined shape such that when inflated, the treatment head takes the form of an umbrella, the shaft including an inner lumen adapted to supply a fluid to the canopy for inflation.
13. The treatment catheter of claim 12, the treatment head further comprising:
a frame assembly supporting the canopy, the frame assembly comprising a runner, a plurality of main ribs, a supporting rib coupled to each main rib, and an upper joint, the runner coupled to the shaft and moveable in an axial direction thereon, each main rib having a main rib outer end and a main rib inner end pivotally coupled to the shaft distal end at the upper joint, each supporting rib having a supporting rib inner end pivotally coupled to the runner and a supporting rib outer end pivotally coupled to the main rib, wherein the movement of the runner along the shaft from distal the upper joint to proximate the upper joint positions the frame assembly between a closed and deployed position, and therefore closes and deploys the canopy.
14. The treatment catheter of claim 1, the treatment head further comprising:
an inflatable canopy having a protection side facing a direction proximal to the shaft and a treatment side distal from the shaft, the inflatable canopy having a predefined shape such that when inflated, the treatment head takes the form of an umbrella, the shaft including an inner lumen adapted to supply a fluid to the canopy for inflation.
15. The treatment catheter of claim 14, the treatment head further comprising:
a frame assembly supporting the canopy, the frame assembly comprising a runner, a plurality of main ribs, a supporting rib coupled to each main rib, and an upper joint, the runner coupled to the shaft and moveable in an axial direction thereon, each main rib having a main rib outer end and a main rib inner end pivotally coupled to the shaft distal end at the upper joint, each supporting rib having a supporting rib

inner end pivotally coupled to the runner and a supporting rib outer end pivotally coupled to the main rib, wherein the movement of the runner along the shaft from distal the upper joint to proximate the upper joint positions the frame assembly between a closed and deployed position, and therefore closes and deploys the canopy.

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16. The treatment catheter of claim 1, the treatment head further comprising:
an inflatable treatment head disposed about the shaft distal end, the inflatable treatment head substantially axially bisected defining a protection side and a treatment side, the shaft including at least one inner lumen adapted to supply a fluid to the canopy for inflation.

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17. The treatment catheter of claim 1, the treatment head further comprising:
an inflatable treatment head disposed about the shaft distal end, the inflatable treatment head substantially axially bisected into a first balloon and a second balloon defining a protection balloon and a treatment balloon, the shaft including at least two inner lumens each adapted to supply a fluid to one of the protection balloon and a treatment balloon for inflation.

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18. The treatment catheter of claim 1, the shaft further comprising a first lumen configured and dimensioned to receive a guide wire for directing the catheter.

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19. Method of treating a first tissue layer while protecting a second tissue layer from treatment, comprising:

percutaneously placing a treatment catheter comprising:

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a shaft having a shaft distal end;

a treatment head disposed about the shaft distal end, the

treatment catheter adapted to present a low profile in a closed state and

a broad profile in a deployed, the treatment catheter adapted to treat

one of first and second tissue layers and protect the other of the first

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and second tissue layers from the treatment;

positioning a treatment side of a treatment head adjacent to the first tissue layer;

- opening the treatment head;
placing the treatment side in intimate contact with the first tissue layer;
treating the first tissue layer;
closing the treatment head; and
5 withdrawing the treatment catheter.
20. The method of claim 19, wherein placing the treatment side in intimate contact with the first tissue layer comprises: .
pulling on the treatment catheter to place the treatment side in intimate contact
10 with the first tissue layer.
21. The method of claim 19, wherein placing the treatment side in intimate contact with the first tissue layer comprises:
pushing on the treatment catheter to place the treatment side in intimate
15 contact with the first tissue layer.
22. The method of claim 19, wherein treating the first tissue layer comprises:
ablating the first tissue layer.
- 20 23. The method of claim 22, wherein ablating the first tissue layer comprises:
electrocauterising the first tissue layer.
24. The method of claim 22, wherein ablating the first tissue layer comprises:
cryogenically cooling the first tissue layer.
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25. The method of claim 22, wherein ablating the first tissue layer comprises:
ablating the first tissue layer using radio-frequency energy.
26. The method of claim 22, wherein ablating the first tissue layer comprises:
30 ablating the first tissue layer using harmonic vibration.

27. The method of claim 22, wherein ablating the first tissue layer comprises:
ablating the first tissue layer using laser energy.
- 5 28. The method of claim 22, wherein ablating the first tissue layer comprises:
ablating the first tissue layer using infrared energy.
29. The method of claim 22, wherein ablating the first tissue layer comprises:
ablating the first tissue layer using ultrasound energy.
- 10 30. The method of claim 22, wherein ablating the first tissue layer comprises:
ablating the first tissue layer using chemical stimulation.
31. The method of claim 19, wherein treating the first tissue layer comprises:
15 applying medicine for an effective period of time to treat a body space
condition.
32. The method of claim 19, wherein treating the first tissue layer comprises:
applying a chemical pleurodesant agent for an effective period of time to treat
20 a body space condition.
33. The method of claim 19, wherein treating the first tissue layer comprises:
applying a chemotherapeutic drugs for an effective period of time to treat a
body space condition.
- 25 34. The method of claim 19, wherein treating the first tissue layer comprises:
applying an antibiotics for an effective period of time to treat a body space
condition.

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